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PASSIVATION METHOD FOR ZINC-NICKEL COATS

The invention relates to a method of passivating zinc-nickel coats.

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The passivation of electroplate coatings is known and serves for corrosion protection and also as a tie substrate for further coatings, such as plastic coatings or paints, for example.

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The prior art methods fall back on a chromating operation, in the course of which, preferably, a chromium(VI) coat is produced which provides good corrosion resistance. Here, in conjunction with zinc, blue-yellow, black and olive chromate conversion coats and, for nickel transparent, yellow and black chromate conversion coats are known, each of which differ in their corrosion resistance.

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For the zinc-nickel field, black chromating as corrosion protection with a preferential esthetic effect has found widespread use.

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The German laid-open specification 33 02 502 describes a chromating method for a zinc-cobalt coating.

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The widespread use of chromates as a corrosion protection coat possesses considerable disadvantages. For instance, the chromium(VI) employed primarily is carcinogenic. An additional protective coating is therefore necessary in order to prevent skin contact. This leaves unresolved, however, the problem that chromium(VI)-coated parts constitute a considerable environmental burden, particularly as disused contaminated material. The costs of environment-friendly disposal of chromium(VI)-coated parts are high.

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In order to avoid the unwanted chromium(VI), it is also possible to employ chromium(III) passivation with a blue color. However, like the other known alternative of molybdenum passivation, the chromium(III) passivation possesses inadequate corrosion protection properties. In particular, the two aforementioned chromating methods are not suitable for zinc-nickel coatings.

10 A further problem which occurs primarily with the black passivation of zinc-nickel coatings lies in the approximately 2 μm of material removed from the zinc-nickel coat. At a total coat thickness of about 10 μm , this removed material represents a cost factor of about
15 20%.

Additionally, the rise of chromium(III) and zinc in the chromating solution results in this solution being rapidly consumed, and necessitates frequent rebatching of the solution and disposal of the spent solution.
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The invention is therefore based on the problem of providing a passivation for zinc-nickel coatings which is not accompanied by any health hazard nor by difficulties associated with disposal, and which leads to a cost saving.
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The problem is solved by a method as claimed in claim 1.
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In this method, the zinc-nickel surface is treated with an oxidizing agent, avoiding any use of chromium, and can subsequently be coated with a further coat.

35 The coating can serve to improve the visual quality of the surface or to increase the slip properties. Furthermore, other coats can be applied as a corrosion protection coat.

A particular advantage of the passivation of the invention is its good red rust resistance. This is attributable to the surface structure which arises from the oxidative treatment.

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The zinc-nickel coat passivated in accordance with the invention can be treated with any desired conversion coat or else directly with a low-friction lacquer. Suitable conversion coats include organic or inorganic coating systems: silicates or polymer waxes, for example.

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The conversion coat is preferably composed of Aquares, which in this combination affords particular protection against white rust. Atop the Aquares coat it is then possible, additionally, to apply a low-friction lacquer in order to achieve optimum slip properties in the coated component. A preferred low-friction lacquer used is Molykote D708 from the company Molykote.

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In the text below, an exemplary embodiment is described in greater detail in order to illustrate the invention.

The components are first of all electrocoated with a 12 to 15.5% zinc-nickel coat. This zinc-nickel coat is oxidized using ammonium peroxide sulfate at a pH of 1.8. In order to improve the visual or technical quality, the oxidized zinc-nickel coat is aftertreated. This aftertreatment may consist of an inorganic or organic film.

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Example 1: (inorganic film)

An inorganic film is formed by a solution containing sodium silicate in dissolved form:

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50 g/l sodium silicate
pH of 8-10 (set using sodium hydroxide solution or dilute phosphoric acid)

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Example 2: (organic film)

- 50 g/l acrylate-styrene copolymer (such as Acronal
567 D from BASF)
5 2 g/l isopropanol
0.01 g/l thickener
pH 8-10 (set using dilute ammonia)

Example 3: (organic film)

- 10 25 g/l polyethylene wax (such as Luwax OA2 from BASF)
2 g/l Lutensol ON110 (surfactant, BASF, as emulsifier
for wax)
pH = 8-10 (set using dilute ammonia)

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Example 4: (organic film)

- It is also possible to apply organic films by means of
electrocoating. Suitable with preference for this
20 purpose is a cathodic dip coating operation in which
the workpiece is connected as the cathode in a
corresponding aqueous solution. Hydrogen is formed at
the cathode and, consequently, there is an increase in
the pH in the cathode film. At high pH, the dissolved
25 organic constituents are precipitated and form a thin
film on the surface. This film greatly reduces the
surface conductivity. When all of the surface has been
coated, therefore, there is a considerable increase in
voltage and the coating process is at an end.
30 Downstream drying is then a baking operation at
approximately 180°C.

- In appropriate solutions, furthermore, it is also
possible to connect the workpieces as the anode (anodic
35 electrocoating). In this case, oxygen is evolved at the
anode and hence the pH is lowered downward (lower
values). The polycarboxylic acids dissolved beforehand,
for example, with ammonia are then deposited again.